Instructions: Review the instructions below for an overview of each step that needs to be taken for the economic analysis of a private facility. Then, start at Worksheet A and work through each of the worksheets until you finish the analysis. The next tab after this one--the 'Summary Worksheet' tab--is to be filled out after you work through each worksheet in order to summarize your results. For a Non-Degredation analysis, go directly to the second to last tab, read the instructions, and then start at Worksheet A.

Summarized below are the steps that need to be taken for the economic analysis of a private facility. Also provided to the right is a flowchart that summarizes those same steps. It is highly recommended that you read through the complete 'EPA Interim Economic Guidance for Water Quality Standards' (EPA Guidance) which can be found on-line at http://www.epa.gov/waterscience/standards/econworkbook/. The instructions in this Excel spreadsheet are not meant to be a substitute for the full EPA Guidance. The worksheets provided in this Excel document correspond directly to the EPA Guidance, although certain changes have been made in several sections in order to tailor this analysis to Montana's needs..

The analytic approach presented here can be used for a variety of private-sector entities, including commercial, industrial, residential and recreational land uses, and for point and nonpoint sources of pollution. The guidance provided in this chapter, however, is not meant to be exhaustive. The State and/or EPA may require additional information or tests in order to evaluate whether substantial and widespread impacts will occur.

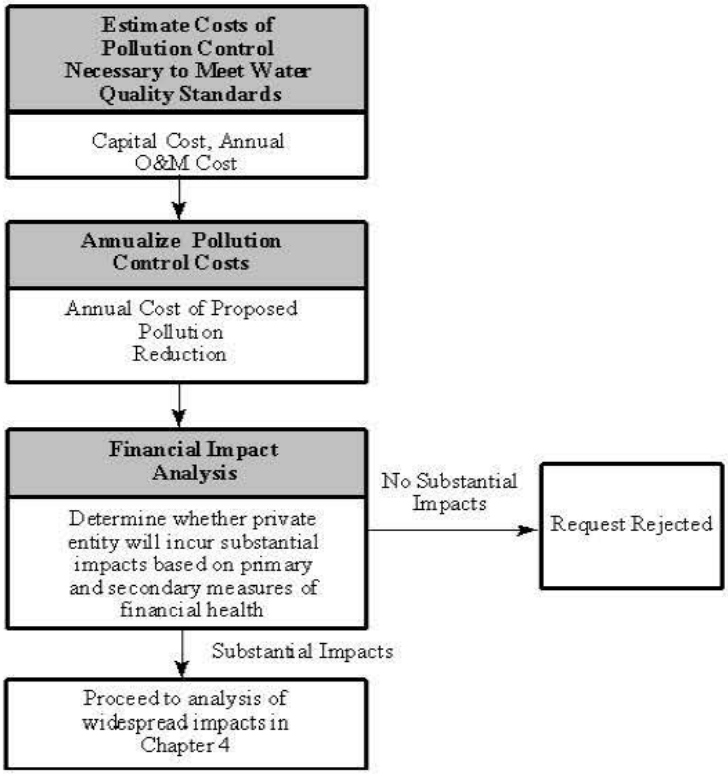
In addition, the applicant should feel free to include any additional information they feel is relevant. The steps described in further detail in the rest of the chapter are:

Step 1: Verify Project Costs and Calculate the Annual Cost of the Pollution control project

Step 2: Run a Financial Impact Analysis on the Private Entity to assess the extent to which existing or planned activities and/or employment will be reduced as a result of meeting the water quality standards. In other words, will the standards result in **substantial** impact to the private entity? The primary measure of whether substantial impact will occur is change in profitability. The secondary measures include indicators of liquidity, solvency, and leverage.

Step 3: If impacts on the private entity are expected to be substantial, then the applicant goes on to demonstrate whether they are also expected to be **widespread** to the study area ("DEQ Widespread Criteria" tab)**.**

Figure 3-1:
Measuring Substantial Impacts
(Private Entities)



Instructions: Fill out the Summary Worksheet below in order to summarize the results that you reach for each step for your analysis. This is to help give a simple overview of what you found out.

Step 1: Verify Project Costs and Calculate the Annual Cost of the Pollution control project _____

Step 2: Run a Financial Impact Analysis on the Private Entity to assess the extent to which existing or planned activities and/or employment will be reduced as a result of meeting the water quality standards. Report the results here. The main question to answer is whether having to meet the water quality standards result in substantial impact to the private entity? The primary measure of whether substantial impact will occur to the private entity is profitability. The secondary measures include indicators of liquidity, solvency, and leverage. _____

Step 3: If impacts on the private entity are expected to be substantial, then the applicant goes on to demonstrate whether they are also expected to be **widespread** to the study area (Go to "DEQ Widespread Criteria" tab)**.** _____

Step 4: Present the Final Conclusion

_____

Worksheet A--Pollution Control Project Summary Info

The first step in the financial impact analysis is an evaluation of the proposed pollution control project. Private entities should consider a broad range of discharge management options including pollution prevention, end-of-pipe treatment, and upgrades or additions to existing treatment. Specific types of pollution prevention activities to be considered include:

Change in Raw Materials;
Substitute Process Chemicals;
Change in Process;
Water Recycling and Reuse; and
Pretreatment Requirements.

Whatever the approach, the discharger must demonstrate that the proposed project is the most appropriate means of meeting water quality standards and must document project cost estimates. **If at least one of the treatment alternatives that allows the applicant to meet water quality standards would not impose substantial impacts, then they are not able to demonstrate substantial impacts and should not proceed with the analysis presented in the remainder of this workbook (no variance will be given).**
Since the most cost-effective approach to meeting water quality standards should be considered, submissions should list their assumptions about excess capacity, future facility expansion, and alternative technologies. The most accurate estimate of project costs may be available from the discharger's design engineers. These estimates can be compared to estimates available from EPA.

Note: most cost effective project preferred

Please describe the pollution control project being proposed and how the project meets water quality standards:

Please describe the other pollution control options considered, explaining why each option was rejected. Explain how each alternative would have met water quality standards:	
Is the proposed project the least expensive? If not, give reasons why it is not.	
For the project chosen, provide assumptions about excess capacity, future facility expansion, and alternative technologies considered:	

Worksheet G--Annual Cost of Project

Is there an effective way to meet water quality standards that is affordable to applicant?

If no, calculate total annualized project costs:

Capital Costs to be financed (supplied by the applicant):	(1)		$_____ (1)
Interest Rate for Financing (expressed as a decimal)	(i)		0.05
Time period of financing (Assume 10 years)*	(n)		10
Annualization Factor =[i/ [[(1+i)to nth power -1]]+i (or see Appendix B)	(2)		0.129504575
Annualized Capitla Cost [(1) X (2)]	(3)		#VALUE!
Annual Costs of Operation and Maintenance (including but not limited to: monitoring, inspection,permitting fees, waste disposal charges, repair, administration and replacement.) (Please list below and state in terms of dollars per year)	(4)	List costs: Sum of total O&M costs	_____ _____ _____ _____ $_____(4)
Total Annual Cost of Pollution Control Project [(3) + (4)]	(5)		#VALUE!

* Actual payback schedules may differ across projects and companies, assume equal annual payments over a 10-year period for consistency in comparing costs.

Tests for Substantial Impacts

The test for Substantial Impact of a private firm consists of the Financial Impact Analysis

The purpose of the F**inancial Impact Analysis** is to assess the extent to which existing or planned activities and/or employment will be reduced as a result of meeting water quality standards. In other words, will there be a substantial adverse impact on the applicant as a result of having to meet additional wastewater standards? An example of this might be employment or local purchases being lost as a result of this impact.

For the Financial Impact Analysis, the Profit Test is considered first. Then, the three financial tests. If the impact is found to be substantial, then a Widespread Impact should be looked at.

Primary Measure--Profit: How much will profits decline due to pollution control expenditures?

Secondary Measures--

Liquidity: How easily can an entity currently pay its short-term bills?
Solvency--How easily can an entity pay its fixed and long-term bills currently and after additional wastewater treatment costs?
Leverage--How much money can the entity currently borrow?

Profit and solvency ratios are calculated with and without the additional compliance costs (taking into consideration the entity's ability to increase its prices to cover part or all of the costs)

Comparing these ratios to each other and to industry benchmarks provides a measure of the impact on the entity of additional wastewater costs.

For all of the tests, it is important to look beyond the individual test results and evaluate the total situation of the entity.

The results should be compared with the ratios for other entities in the same industry or activity. The ratios and tests will be calculated for several years of operations.

See Chapter 3 in the EPA guidance for more info.

Each type of test measures a different aspect of a discharger's financial health. The primary measure evaluates the extent to which an applicant's profit rate will change, and compares the profit level to typical profits in that industry. The secondary measures provide additional information about specific impacts that the discharger would bear if required to meet water quality standards. In some cases, the tests might indicate that the discharger would remain profitable (Profit Test) after investing in pollution control, but would have trouble borrowing the needed capital (Leverage Test). This situation would indicate a need to work with the discharger in choosing the technology and schedule used to meet the regulations. In other cases the tests might show that the discharger has a short-term problem with meeting the financial obligation imposed by the standards, but could handle it in the long-run (Liquidity vs. Solvency). This is important information when considering whether or not to grant a variance so as to allow more time for compliance.

Aside from these several measures of firm financial health:
The structure, size, and financial health of the parent firm should also be considered. An important factor, which may not be reflected in the preceding measures, is the value of an applicant's product or operations to its parent firm. For example, if a facility produces an important input used by other facilities owned by the firm, the firm may be likely to support the facility even if it appears to have only borderline profitability. The results of these tests and other relevant factors, can be used to make a judgement as to the likely actions of the applicant (e.g. shut down entirely, close one or more product/service lines, shift to other products/services, not proceed with an expansion, continue operations at current levels) faced with the pollution control investment.

Tests for Substantial Impacts

Worksheet H--Primary Measure: Profitability
Calculation of Earnings Before Taxes with and without Pollution Control Costs

The Profit Test measures what will happen to the discharger's earnings if additional pollution control is required. If the discharger is making a profit now but would lose money with the pollution control, then the possibility of a total shutdown or the closing of a production line must be considered. Greatly reduced, but still positive, profits are also of concern. Likewise in the case of a proposed facility or proposed expansion; if estimated profits would drop considerably with pollution control, then the development might not take place.

Profit Test = Earnings Before Taxes / Revenues.
This needs to be calculated with and without the cost of pollution control. How much would profit be affected, and what effect would this have on the private entity? What was the discharger's profit rate before pollution control and how did that compare with the industry as a whole or with similar facilities?

Earnings with pollution control costs should be calculated for the latest year with complete financial information. Arguably, as long as the applicant maintains positive earnings, it can afford to pay for the pollution control.

Although complicated, the analysis should consider whether the discharger or firm would be able to raise its prices in order to cover some or all of the pollution control costs. In such a case, revenues increase and earnings fall by an amount less than the costs of pollution control.

This information can be obtained from financial records from the company or private entity in question.

A. Earnings Without Pollution Control Project Costs

EBT = R - CGS - CO

Where:	EBT	=	Earnings Before Taxes
	R	=	Revenues
	CGS	=	Cost of Goods Sold (including the cost of materials, direct labor, indirect labor, rent and heat)
	CO	=	Portion of Corporate Overhead Assigned to the Discharger (selling, general, administrative, interest, R&D expenses, and depreciation on common property)

Three Most Recently Completed Fiscal Years (FY) or Most Recent Representative Fiscal Year†

	3rd Most Recent FY	2nd Most recent FY	Most recent FY	
Year	20___	20___	20___	
R	$50,000			(1)
CGS	$35,000			(2)
CO	$5,000			(3)
EBT [(1) - (2) -(3)]	$10,000	#VALUE!	#VALUE!	(4)

Considerations: Have earnings before taxes changed over the three year period? If so, what would a "typical" year's EBT be? Please explain below.

_____

B. Earnings With Pollution Control Project Costs

EWPR = EBT - ACPR

Where:	EWPR	=	Earnings with Pollution Control Project Costs
	EBT	=	Earnings Before Taxes (4)
	ACPR	=	Total Annual Costs of Pollution Control Project [Worksheet G, (5)]

	20__ *		
EBT (4)	#VALUE!	(5)	From either most recent year or from most recent representative year
ACPR [Worksheet G, (5)]	#VALUE!	(6)	
EWPR [(5) - (6)]	#VALUE!	(7)	

† For new businesses with no earnings records, provide the projected earnings from the business plan.

* The most recently completed fiscal year

Considerations: Is the discharger expected to have positive earnings after paying the annual cost of pollution control? __ Yes __ No

Tests for Substantial Impacts

Calculation of Profit Rates

With and Without Pollution Control Project Costs

A. Profit Rate Without Project Costs

PRT = EBT ÷ R

Where:	PRT	=	Profit Rate Before Taxes
	EBT	=	Earnings Before Taxes
	R	=	Revenues

Three Most Recently Completed Fiscal Years

Year	20___	20___	20___	
EBT [Worksheet H, (4)]	$10,000	#VALUE!	#VALUE!	(1)
R [Worksheet H, (1)]	$50,000			(2)
PRT = Calculate: [(1)/(2)]	**20.00%**	**#VALUE!**	**#VALUE!**	(3)

Considerations: How have profit rates changed over the three years?

_____

Is the most recent year typical of the three years? Yes/No (If not, you might want to use an earlier year or years for the analysis)

_____

How do these profit rates compare with the profit rates for this line of business? Please discuss below.
Data sources for profit rates in a certain line of business can be found in Moody's Industriial Manual, Dun & Bradstreet's Industry Norms and Key Business Ratios, and Standard and Poor's Industry Surveys.

_____

B. Profit Rate With Pollution Control Costs

PRPR = EWPR ÷ R

Where:	PRPR	=	Profit Rate With Pollution Control Costs
			Before-Tax Earnings With Pollution Control
	EWPR	=	Costs
	R	=	Reveneus

	The Most Recently Completed Fiscal Year or Most Recent Representative Fiscal Year	
	20__	
EWPR [Worksheet H, (7)]	#VALUE!	(4)
R [Worksheet H, (1)]		(5)
PRPR [Calculate: (4)/(5)]	#VALUE!	(6)

Considerations:

What is the percentage change in the profit rate due to pollution control costs ? Calculate as follows: (PRPR - PR)/PR x 100 _____

How does the profit rate without pollution control compare to the profit rate of this line of business? _____

How does the profit rate with pollution control compare to the profit rate of this line of business?

Does the firm's profit remain positive, if it was already positive? _____

Tests for Substantial Impacts

Worksheet J--Secondary Test: Liquidity
Calculation of The Current Ratio

Liquidity is a measure of how easily a discharger can pay its short-term bills.

One measure of liquidity is the Current Ratio, which compares current assets with current liabilities. Current assets include cash and other assets that are or could reasonably be converted into cash during the current year.

Calculation of The Current Ratio

CR = CA ÷ CL

Where:	CR	=	Current Ratio
	CA	=	Current Assets (the sum of inventories, prepaid expenses, and accounts receivable)
	CL	=	Current Liabilities (the sum of accounts payable, accrued expenses, taxes, and the current portion of long-term debt)

Three Most Recently Completed Fiscal Years (FY)

	3rd Most Recent 20___	2nd Most recent 20___	Most recent 20___	
CA	$500,000	$_____	$_____	(1)
CL	$300,000	$_____	$_____	(2)
CR [Calculate: (1)/(2)]	1.666666667	#VALUE!	#VALUE!	(3)

Considerations: _____

Is the most recent year typical of the three years for the Current Ratio? __ Ye_____

(If not, you might want to use an earlier year or years for the analysis)

Is the Current Ratio (3) greater than 2.0? __ Yes __ No _____

How does the Current Ratio (3) compare with the Current Ratios for other firms in this line of business? _____

Data sources for certain ratios in various lines of business can be found in Moody's Industrial Manual, Dun & Bradstreet's Industry Norms and Key Business Ratios, and Standard and Poor's Industry Surveys, Annual Statement Studies, and Dun's Industry Norms.

Conclusion/Comment:

The general rule is that if the Current Ratio is greater than 2, the entity should be able to cover its short-term obligations. Frequently, lenders require this level of liquidity as a prerequisite for lending.

In addition, this rule (Current Ratio > 2) may not be appropriate for all types of private entities covered by Water Quality Standards. The Current Ratio of the discharger in question should be compared with ratios for other dischargers in the same line of business.

If the discharger's ratio compares favorably with the median or upper quartile ratio for similar businesses, it should be able to cover it's short term obligations.

Tests for Substantial Impacts

Worksheet K-Secondary Test: Solvency
Calculation of Beaver's Ratio

Solvency is a measure of an entity's ability to meet its fixed and long-term obligations.
These obligations are bills and debts that are owed on a regular basis for periods longer than one year.
Solvency tests are commonly used to predict financial problems that could lead to bankruptcy within the next few years.

Since any single year of data can easily be
distorted by unusually high or low net income or by the timing of debt, solvency tests
must be considered over at least three years of data in order to reveal long-term trends.

One commonly used solvency test (called Times Interest Earned) compares income before interest and taxes
to interest expenses. Another solvency test, the Beaver's Ratio, compares cash flow to
total debt. This test has been shown to be a good indicator of the likelihood of bankrupty

Worksheet K

Calculation of Beaver's Ratio

BR = CF ÷ TD

Where:	BR	=	Beaver's Ratio	
	CF	=	Cash Flow	the cash the entity has available to it in a given year
	TD	=	Total Debt	debt for the current year plus the long term debt

	3rd Most Recent 20___	2nd Most recent 20___	Most recent 20___			Comparison with pollution control costs 20___	20___	20___
Cash Flow:								
Net Income After Taxes	$50,000	$_____	$_____	(1)	Net Income After Taxes			
Depreciation	$6,000	$_____	$_____	(2)	Depreciation			
CF [Calculate: (1) + (2)]	56000	#VALUE!	#VALUE!	(3)	CF [Calculate: (1) + (2)]			

Total Debt:					Total Debt:
Current Debt	$45,000	$_____	$_____	(4)	Current Debt
Long-Term Debt	$200,000	$_____	$_____	(5)	Long-Term Debt
Total Debt (4) + (5)	$245,000	$_____	$_____	(6)	Total Debt (4) + (5)
Beaver's Ratio:					Beaver's Ratio:
BR [(3) /(6)]	**0.2285714**	**#VALUE!**	**#VALUE!**	(7)	BR [(3) /(6)]

Considerations:

Is the most recent year typical of the three years? __ Yes __ No
(If not, you might want to use an earlier year or years for the analysis)

Is the Beaver's Ratio for this discharger greater than 0.2? __ Yes __ No Solvent

Is the Beaver's Ratio for this discharger less than 0.15? __ Yes __ No Bankruptcy is possible

Is the Beaver's Ratio for this discharger between 0.2 and 0.15? __ Yes __ No Gray area

If possible, run the Beaver's Ratio again with pollution control costs and compare the two _____

How does this ratio compare with the Beaver's Ratio for other firms in the same business? _____
This information can be found in Moody's Industrial Manual.

The discharger's Beaver's Ratio should be compared with the ratios of similar dischargers. _____

Conclusion/Comment:

Tests for Substantial Impacts

Worksheet L: Secondary Test: Leverage
Debt to Equity Ratio

Leverage tests measure the extent to which a firm already has fixed financial obligations and thus indicate how much money a firm is capable of borrowing
Most leverage tests compare equity to some measure of debt or fixed assets.
The Debt to Equity Ratio is the most commonly used method of measuring leverage.

The debt to equity ratio must be calculated for the entire firm. The ratio measures how much the firm has borrowed (debt) relative to the amount of capital which is owned by its stockholders (equity).

The Debt to Equity Ratio is equal to Long-Term Liabilities (long-term debt such as bonds, debentures, and bank debt, and all other noncurrent liabilities like deferred income taxes) divided by Owners' Equity. Owner's Equity is the difference between total assets and total liabilities, including contributed or paid in capital and retained earnings. For publicly held firms, use Net Stockholders Equity (which is the equivalent of Total Stockholder Equity minus any Treasury Stock).

Since there are no generally accepted Debt/Equity Ratio values that apply to all types of economic activity, the ratio should be compared with the ratio of firms in similar businesses. If the entity's ratio compares favorably with the median or upper quartile ratio for similar businesses, it should be able to borrow additional funds.

Data sources for certain ratios in various lines of business can be found in Moody's Industrial Manual, Dun & Bradstreet's Industry Norms and Key Business Ratios, and Standard and Poor's Industry Surveys, Annual Statement Studies, and Dun's Industry Norms.

This ratio is not appropriate for entities with special sources of funding such as Agriculture and affordable housing. In those cases, the measure is the probabilty that the project willl receive money for meeting standards.

Debt to Equity Ratio

DER = LTL ÷ OE

Where:	DER	=	Debt/Equity Ratio
	LTL	=	Long-Term Liabilities (long-term debt such as bonds, debentures, and bank debt, and all other noncurrent liabilities such as deferred income taxes)

OE	=	Owner Equity (the difference between total assets and total liabilities, including contributed or paid in capital and retained earnings)

Three Most Recently Completed Fiscal Years

	3rd Most Recent 20___	2nd Most recent 20___	Most recent 20___	
LTL	$_____	$_____	$_____	(1)
OE	$_____	$_____	$_____	(2)
DER [(1)/(2)]	#VALUE!	#VALUE!	#VALUE!	(3)

Considerations:

Is the most recent year typical of the three years? __ Yes __ No _____

(If not, you might want to use an earlier year or years for the analysis or an average of recent years) _____

Conclusion: How does the Debt to Equity Ratio compare with the ratio for firms in the same business? _____

Tests for Substantial Impacts

Substantial Impacts Determination

The purpose of the financial impact analysis is to assess the extent to which existing or planned activities and/or employment will be reduced as a result of meeting water quality standards. Will there be a substantial adverse impact on the applicant as a result of having to meet standards? Will employment or local purchases be lost? This is first done by assessing the effect on profits and the three secondary measures. Then, the question is asked as to what effect changes in these measures will affect the business (e.g. employment, planned activities, etc.)

The Profit Test is considered first. Then, the three financial tests. If the impact is found to be substantial, then a Widespread Impact should be looked at.

Primary Measure--Profit: how much will profits decline due to pollution control expenditures?

Secondary Measures--

Liquidity--how easily can an entity pay its short-term bills?
Solvency--how easily can an entity pay its fixed and long-term bills?
Leverage--how much money can the entity borrow?

Profit Test		**Liquidity Test**		**Solvency Test**		**Leverage Test**	
Profit Rate before pollution costs	_____	What is the Current ratio?	_____	What is the Beaver's ratio?	_____	What is the Debt to Equity Ratio?	_____
Profit Rate after pollution costs	_____	What does the Current ratio indicate for liquidity?	_____	What does the Beaver's ratio indicate for solvency?	_____		
What is the percentage change in the profit rate due to pollution control costs ? Calculate as follows: (PRPR - PR)/PR x 100	_____			How does this ratio compare with the Beaver's Ratio for other firms in the same business?			
How does the profit rate with pollution control compare to the profit rate of this line of business?	_____	How does the Current Ratio (3) compare with the Current Ratios for other firms in this line of business?	_____			How does the Debt to Equity Ratio compare with the ratio for firms in the same business?	_____
Conclusion: Would this value be substantially influenced by having to pay pollution control costs?	_____	***Conclusion: Would this value be substantially influenced by having to pay pollution control costs?***	_____	***Conclusion: Would this value be substantially influenced by having to pay pollution control costs?***	_____	***Conclusion: Would this value be substantially influenced by having to pay pollution***	_____

Will the change in any of these values as a result of pollution control costs reduce planned activities for the discharger and result in substantially less economic acitivy such as unemployment? If so, please explain.

What are the chances that additional wastewater treatment costs would close down the private entity?

Using your best professional judgement, are the financial health impacts to the private entity from having to meet pollution controls Substantial? See suggested criteria below. Please explain.

Suggest Criteria for Substantial Effects on a Private entity
Profit margin:
One of the following two criteria must be met to say that there is a substantial impact from wastewater costs.
1) The firm was profitable (profit more that zero percent) before wastewater costs, but is unprofitable (profit less than zero percent) after wastewater costs
2) The profit level of the firm in question was within the given range of profit levels of firms nationwide within that same industry. After wastewater costs, it was no longer in that range of profit level or Other??
If neither of these occur, then one can look at the three seconard tests.

Three secondary tests:
If the firm would fail two or three out of the three secondary tests AS A RESULT OF wastewater costs, then there is a substantial impact from wastewater costs, regardless of the Profit test results. If it failed these tests before wastewater costs, then impacts are not substantial.

Do we even need the following?
Firm Health:
If the firm can prove that it might have to scale back or shut down as a result of wastewater costs, then a substantial impact argument can be made.

Still, if a substantial impact finding is made, a Widespread impact analysis has to be made as well (see next tab).

Things to Consider:
If the discharger is making a profit now but would lose money with the pollution control, then the possibility of a total shutdown or the closing of a production line must be considered. Likewise in the case of a proposed facility; if it would make money without the pollution control but would make much less or even lose money with it, then the development might not take place. In either case, there is the chance that employment will be lost and local purchases by the discharger reduced. Whether or not these impacts will be considered widespread is addressed in Chapter 4.

Another possible scenario is that the discharger may shift to an alternative economic activity (e.g., manufacture another product or produce a different crop). While the applicant will not have gone out of business, this shift may result in reduced profits, employment, and purchases in the local community that must be considered. In each case, it is important to take the entire picture presented by the four ratios into account in judging whether or not the discharger will incur substantial impacts due to the cost of the necessary pollution reductions.

Using the guidance presented in this chapter, applicants that feel they have demonstrated substantial impacts should proceed to Chapter 4: Determination of Widespread Impacts. If dischargers are not able to demonstrate substantial impacts, the entity must meet existing standards. If a group of dischargers within the community will experience the substantial impacts resulting from compliance with water quality standards, these impacts should be considered jointly when assessing whether or not the impacts will be widespread.

Criteria for Widespread Impacts

DEQ Widespread Criteria - Factors to Consider in Making a Determination of Widespread Social and Economic Impacts

The financial impacts of undertaking pollution controls could potentially cause far-reaching and serious socioeconomic impacts. If the financial tests outlined in Chapter 2 and 3 of the EPA Guidance or in the Substantial Test tabs of this worksheet suggest that a discharger (public or private) or group of dischargers will have difficulty paying for pollution controls (**that the effects will be Substantial)**, then an additional analysis must be performed to demonstrate that there will be widespread adverse impacts on the community or surrounding area. There are no economic ratios per se that evaluate socioeconomic impacts. Instead, the relative magnitudes of **changes in** indicators such as increases in unemployment, losses to the local economy, and changes in disposable income should be taken into account when deciding whether impacts could be considered widespread. Since EPA does not have standardized tests and benchmarks with which to measure these impacts, the following guidance is provided as an example of the types of information that should be considered when reviewing impacts on the surrounding community.

At a minimum, the analysis must define the affected community (the geographic area where project costs pass through to the local economy), consider the baseline economic health of the community, and finally evaluate how the proposed project will affect the socioeconomic well-being of the community. Applicants should feel free to consider additional measures not mentioned here if they judge them to be relevant. Likewise, applicants should not view this guidance as a check list. In all cases, socioeconomic impacts should not be evaluated incrementally, rather, their cumulative effect on the community should be assessed.

Answer the seven 'Descriptive Categories' as fully as possible. Then, answer the seven primary criteria. **The answers to these primary criteria in relation to the Descriptive categories will form the backbone of the final answer to whether impacts would be Widespread.** If there is still uncertainty as to whether impacts are widespread, answer the Secondary questions. The Secondary questions are used to help answer the question of whether impacts are Widespread if the Primary Criteria do not yield a clearcut answer. The interdependence between the affected entity(ies) and the affect community is a major factor in demonstrating that the impacts are widespread.

INPUT CATEGORY	Weight of Importance	Answer	
Descriptive			
Define the affected study area or community. This is the geographic area where direct project costs pass through to the local economy. In the case of a private entity pollution control project, the affected community may be the immediate municipality. There are, however, exceptions where the affected community includes individuals and areas outside the immediate community. For example, if business activity of the region is concentrated in the immediate community, then outlying communities dependent upon the immediate municipality for employment, goods, and services should also be included in the analysis. Thus, the Widespread geographical area can encompass a greater area than the immediate town and/or those served by the wastewater system. It can encompass a greater area than defined in Substantial impacts.[1] (1)	Descriptive	_____	
Describe the current general economic trend in the study area or community--qualitatively or quantitatively. (2)	Descriptive	_____	See http://censtats.census.gov/usa/usa.shtml and http://censtats.census.gov/usa/usa.shtml. Also, contact Susan Ockert-
Name the main industry(s) in the study area and indicate if any major industries are intending to enter the area or leave the area. Is the affected private entity part of the main industry(s)? What is the current health of that main industry or of each industry if more than one? Is the boom and bust	Descriptive	_____	Contact Susan Ockert-Montana Dept of Commerce/Census and Economic Information Center, (406) 841-2740.
Indicate the general population trend in the area. Is the community growing or shrinking? Specifically state if young people are staying in the area or leaving after they graduate school. (4)	Descriptive	_____	Contact Susan Ockert-Montana Dept of Commerce/Census and Economic Information Center, (406) 841-2740 or go to http://ceic.mt.gov/Demog/estimate/pop/City/SUB-EST2007-04-30.htm
What is the role of the effected private entity in the community? How big of an employer is the affected entity in the study area? (5)	Descriptive		
What is the tax revenue paid by the private entity--both in annual dollars and as a percentage of the affected community's total tax revenue? (6)	Descriptive		

Is the entity a primary producer of a particular product or service upon which other nearby businesses or the affected community depend? (7)	Descriptive

[1] Here are some examples. If business activity in the region is concentrated in a nearby community and not in the immediate community, then the nearby community may also be affected by loss of income in the immediate community and should be included in the analysis. Similarly, if a large number of workers commute to an industrial facility that is significantly affected by the costs, then the affected community should include the home communities of commuters as well as the immediate community.

Primary Criteria

Answer the following 'Primary' questions. If the answers to questions 8 through 14 clearly indicate that there would be No Widespread Impacts, you may answer the secondary questions or end the analysis. If the answers to questions 8 through 14 are inconclusive, then answer the secondary questions. If the answers to questions 8 through 13 indicate that Impacts are Widespread, and the answer to 14 indicates no widespread benefits from meeting standards, then there **will likely** be widespread impacts according to the analysis. In this case, you are not required to answer secondary questions but you may if you want to. If the answers to questions 8 through 13 indicate that Impacts will be Widespread, and answer to 10 is that there might be positive widespread benefits from meeting standards, then there may not be widespread impacts. Please answer secondary questions in that case.

Describe how the economy in general would be affected, if at all, by the private entity(s) having to meet higher water quality standards. Items of discussion (if applicaable) could include any estimated loss in population, changes in median income, changes in total household income, the closing (or moving elsewhere) of one or more businesses and industries, or the impact on community and/or commercial development potential in the study area. One can use the socio-economic Substantial Tests for a Public Entity to support this answer. (8)	Primary Importance
Will the private entity(s) meeting the nutrient standards lead to a loss of employment due to a reduction in business activity or closure? If so, how many people do you estimate (or what % increase in unemployment rate) would become unemployed as a result? Please give specific examples of what might happen using your best professional judgement (9)	Primary Importance
If unemployment occurred as a result of meeting standards, are there other ample job opportunities to take up the slack (refer to current unemployment rate in Secondary test)? Please give examples. (10)	Primary Importance
Will the private entity having to meet standards have a substantial effect on residential and commercial development patterns. For example, would homes and businesses choose to locate in different areas as a result of higher wastewater fees? In this answer, one may explore historical deveolopment patterns, financial and/or tax revenue impacts, population growth impacts, unintended impacts on water quality and any other potential consequences (good or bad). (11)	Primary Importance
What would be the estimated impact on disposable income, if any, of the private entity having to meet standards? How would any change in disposable income affect the overall economy in the area under consideration? Please give specific examples of what might happen using your best professional judgement (12)	Primary Importance
What would be the effect on tax revenues in the study area as a result of the private entity having to meet additional wastewater standards? If tax revenues did drop, would they drop by more than 1%? (13)	Primary Importance

Would increased levels of water quality as a result of meeting water quality standards have any widespread positive economic and/or ecological effects on the community? Would expenditures on pollution controls to reach attainment have any positive effects on the community? (14)	Primary Importance	
Based on your answers to the primary questions, Is there a need to answer these secondary questions?	_____	If no, go to question 22. If yes, answer the secondary questions

Secondary Criteria

Answer these Secondary questions to the best of your ability. If you think any of these are of primary importance, explain further and explain why. Taken as whole, determine whether these secondary questions in addition to the Primary quesitons support or do not support that impacts would be widespread.

What would be the estimated change in Median Household Income, if any, as a result of the private entity having to comply with numeric nutrient standards? Describe qualitatively and/or qualitatively. If any change, how would this affect the Median Household Income of the community in comparison to the state median which is $43,531 (Source: Susan Ockert, CEIC, extracted from Decision Data Resources)? (15)	Secondary	_____	
What would be the estimated change in poverty level, if any, as a result of the private entity having to comply with water quality standards and would that change the comparison to the Montana average? The Montana average percent of households below the poverty line is 14.6% (Suan Ockert). (16)	Secondary	_____	
What would be the impact on property values within the affected area, if any, from having to meet numeric nutrient standards? (17)	Secondary	_____	
Is a large percentage of the wastewater treatment plant used by one or a few entities that would be affected by water quality standards? If yes, and these entities were hurt or closed down as a result of pollution control costs, would significant burden be placed on the rest of the users of that system? (18)	Secondary	_____	
If appropriate, would there be any multiplier effects from cost or benefits as a result of the private entity having to meeting numeric nutrient criteria? In other words will a dollar lost or gained as a result of the criteria result in the loss or gain of more than one dollar in the study area (e.g. direct and indirect spending)? (19)	Secondary	_____	
(For non-deg only). In the case of non-degradation, what is the community's majority opinion on growth and/or the entity coming into the town/region and building a facility? What is the community's majority opinion on degradation of the receiving stream's high quality water? (20)	Most Important (non-deg)	_____	what if triggering nondeg is a result of just general growth in the community?
Is there any additional information that suggests that there are unique conditions in the affected community that should also be considered? (21)	Secondary	_____	
Based on the criteria you just filled out and on your own judgement, will this community experience widespread impacts as a result of higher wastewater costs for the private entity (or 'Important Impacts' for Non-Deg)? Please describe how you reached this decision. (22)		_____	

ARRIVING AT A CONCLUSION: The main question to ask is whether widespread economic impacts are likely to occur in the study area as a result of attempting to comply with numeric nutrient standards? (yes/no) The key aspect of a "widespread determination" is that it evaluate change in the socioeconomic conditions that would occur as a result of compliance (EPA 1995).

The analyst should take into account as many of the factors listed above as possible when making a decision on whether impacts are widespread. The decision should be made based on all appropriate factors in a comprehensive manner (rather than as a checklist). The analyst will use his or her judgement on whether all the factors taken together (including some that may not be on this list) constitute widespread impact. Likewise, applicants should not view this guidance as a check list. In all cases, socioeconomic impacts should not be evaluated incrementally; rather, their cumulative effect on the community should be assessed as a whole. Applicants should feel free to use anecdotal information to describe any current community characteristics or anticipated impacts that are not listed in the worksheet.

The analyst may want to weight some of these factors more than others. In some cases, the results from a single category might be sufficient to determine whether widespread impacts will occur, even if other factors suggest differently. These categories are weighted by how important they are relative to the general idea "widespread" is attempting to address, although the analyst can use their own weights if supported by evidence.

In most cases, impacts at the state level will be relatively minor. If not, then impacts are, BY DEFAULT, widespread

There may be secondary impacts from having to meet numeric nutrient standards (not captured by the primary and secondary tests to the community). Secondary impacts, for example, might include depressed economic activity in a community resulting from the loss of purchasing power by persons losing their jobs or leaving the area due to increased user fees.

Reductions in employment caused by compliance with the water quality standards could be widespread if workers have no other employment opportunities nearby. Impacts may also be significant where the public entity(ies) is a primary producer of a particular product or service upon which other nearby businesses or the affected community depend. The impacts of reduced business activities or closure will be far greater in this case than if the products are sold elsewhere.

Potentially, one of the most serious impacts on the affected community's economy is the loss of employment caused by a reduction in business activity or closure.
Applicants should also consider whether the lack of alternative employment opportunities may lead to an increased need for social services in the affected community.

Appendix C-Conceptual Measure of Economic Benefits of Clean Water (Optional)

In many cases, there may be economic benefits that accrue to the affected community from cleaner water. For example, in a rural community where the primary source of employment is agriculture, the reduction of fertilizer and pesticide runoff from farms would reduce the cost of treating irrigation water to downstream users. Another example might be an industrial facility discharging its wastewater into a stream that otherwise could be used for recreational cold-water fishing. Treatment or elimination of the industrial wastewater would provide a benefit to recreational fishermen by increasing the variety of fish in the stream. In both cases, the economic benefit is the dollar value associated with the increase in beneficial use or potential use of the waterbody. The types of economic benefits that might be realized will depend on both the characteristics of the polluting entity and characteristics of the affected community, and should be considered on a case by case basis.

Since the assessment of benefits requires site-specific information, it will be up to States to determine the extent to which benefits can be considered in the economic impact analysis. This determination should be coordinated with the EPA Regional Office. A more detailed description of the types of benefits that might be considered is given in Appendix C. This appendix is not intended to provide in-depth guidance on how to estimate economic benefits; rather, it is intended to give States an idea of the types of benefits that might be relevant in a given situation.

In valuing benefits associated with an ecological resource such as clean water, a basic distinction is made between the intrinsic value of the existence of the resource and its value in use by the human population. Use values are further subdivided into direct or indirect uses. Other valuation concepts arise from the uncertainty surrounding future uses and availability of the resource. A classification of these valuation concepts, along with examples, is presented in Table C-1 below.

C.1 Use Benefits

Estimating the benefits of clean water will depend upon several variables that describe the attributes of the resource and its uses. A waterbody might be used for recreational activities (such as fishing, boating, swimming, hunting, bird watching), for commercial purposes (such as industrial water supply, irrigation, municipal drinking water, and fish harvesting), or for both. Where recreational activities are created or enhanced due to water quality improvements, the public will benefit in the form of increased recreational opportunities. Similarly, the cost of treating irrigation and drinking water to down stream users could be reduced if pollutant discharges were reduced or eliminated in a particular stretch of river.

Direct use includes both consumptive and non-consumptive uses. Consumptive uses can be distinguished from non-consumptive uses in that the former excludes other uses of the same resource while the latter does not. For example, water is consumed when it is diverted from a waterbody for irrigation purposes. With non-consumptive uses, however, the resource base remains in the same state before and after use (e.g., swimming). Human health benefits associated with cleaner water could be consumptive (reduced illness from eating finfish or shellfish) or non-consumptive (reduced exposure to infectious diseases while recreating).

When estimating benefits, it is important to determine whether or not the resource and its uses (in this case clean water) can be considered market or non-market resources and uses (i.e., does a market exist for the resource or its use). For example, commercial fisheries have a market value reflected by the financial value of landings of a particular species. By contrast, no market exists to describe the value individuals receive from swimming. Where market values are available, they should be used to estimate benefits. In the case of water supply, there may or may not be a market for clean water. Some water users may be required to pay for that use as in the case of a farmer paying a regional water board to divert water for irrigation purposes. This will be particularly true in the arid west. By contrast, a manufacturing facility using water for cooling or process water may not pay anything for the right to pump and use water from an adjacent river. For resources with no market value, a number of estimation techniques including the travel cost, estimation from similar markets, and contingent valuation methods have been developed.

While they are conceptually distinct attributes, consumptive use is frequently associated with markets and non-consumptive use is frequently associated with non-market situations. Some resources that are considered market resources, however, may be used non-consumptively. The converse is also true. As an example of the first, a fee may be charged (other than parking) to gain entrance to a state park, however, while a swimmer's use of a lake in the park is not consuming any part of the lake.

Commercial activities that are dependent on clean water which is not directly owned are said to benefit from indirect use. Examples would be a fishing equipment manufacturer's dependence on healthy fish stocks to induce demand for its products or the dependence of property values on the pristine condition of an adjacent water body. Indirect use is also characterized by the scenic views and water enhanced recreational opportunities (camping, picnicking, birdwatching) associated with the quality of water in a water body. Indirect use benefits such as enhanced property values can be estimated using the hedonic price technique. Care should be taken, however, to not double-count benefits. If property values reflect the proximity to and thus use of water, then the value of the use should not be included separately.

C.2 Intrinsic Benefits

Intrinsic benefits include all benefits associated with a resource that are not directly related to the current use of the resource. Intrinsic benefits are represented by the sum of existence and option values. Existence value indicates an individual's (and society's) willingness to pay to maintain an ecological resource such as clean water for its own sake, regardless of any perceived or potential opportunity for that individual to use the water body now or in the future. Contributions of money to save endangered species such as the snail darter demonstrate a willingness to pay for the existence of an environmental amenity despite the fact that the contributors may never use it or even experience it directly.

Option value is the willingness to pay for having a future opportunity to use resources such as clean water in known or as yet unknown ways. In a sense it is a combination of insurance and speculative value. Individuals routinely pay to store or transport something they are not sure they will use in the future because they recognize it would be more costly to recreate the item than to preserve it. In an ecological sense, pristine habitats and wildlife refuges are often preserved under the assumption that plant or animal species which may yield pharmaceutical, genetic, or ecosystem benefits are yet to be discovered. Option value takes on particular importance when proposed development or environmental perturbations are largely irreversible or pollutants are persistent. Intrinsic benefits are difficult to measure due to the level of uncertainty associated with these benefits. The most common approach to estimating intrinsic benefits, however, is the contingent valuation method, which cannot be described in detail within this short overview.

C.3 Summary: Summarize the Water Quality Benefits of this pollution control project

Total valuation of clean water benefits includes all use and existence values as well as option value. The proper framework for estimating the economic benefits associated with clean water consists of 1) determining when damage first occurs or would occur; 2) identifying and quantifying the potential physical/biological damages relative to an appropriate baseline; 3) identifying all affected individuals both due to potential loss of direct or indirect services or uses, and to potential losses attributable to existence values (may include projections for growth in participation rates); 4) estimating the value affected individuals place on clean water prior to potential degradation; and 5) determining the time horizon over which the waterbody would be degraded or restored to some maximum reduced state of service (if ever), and appropriately discounting the stream of potential lost services. If evaluating an improvement in water quality, the procedures are the same except that benefits gained are measured.

Table C-1: Categories of Use Benefits

Direct	Indirect	Intrinsic
Consumptive:	Fishing Equipment Manufacturer	Option Value (access to resource in future)
Market Benefits	Property Values	Existence Value (knowledge that services of resource exist)
Industrial Water Supply	Aesthetics (scenic views, water enhanced recreation)	
Agricultural Water Supply		
Municipal Water Supply		
Commercial Fishing		
Non-Market Benefits		
Recreational Fishing		
Hunting		
Industrial Water Supply		
Agricultural Water Supply		
Municipal Water Supply		
Non-Consumptive:		
Swimming		
Boating		
Human Health		

Non-Degredation for a Private Entity

Antidegradation is not a "no growth" rule and was never designed nor intended to be one. It is a policy that allows the public to make decisions about important environmental actions. Where the State intends to provide for development, it may decide that some lowering of water quality in "high-quality waters" is necessary to accommodate important economic or social development. Any such reduction in water quality, however, must protect existing uses fully and must satisfy the requirements for intergovernmental coordination and public participation.

To determine if water quality can be lowered for a new private development, the same tests are used as in this worksheet. However, the questions asked are slightly different.

Question:
(1) Will the pollution controls needed to maintain the high-quality water interfere substantially with the proposed private development in a way that compromises its financial well-being? (Analogous to secondary test for Substantial Impacts)
(2) Is the proposed private development important economically and socially to the study area? (Analagous to Widespread Impacts Test)

The tests used to demonstrate 'interference' and 'importance' are the same as those used to demonstrate substantial and widespread impacts. The difference is, however, that an antidegradation review considers situations that would improve the current economic condition as opposed to hurting them.

If the answer is 'no' to either 1 or 2 above, then the analysis is over---no degradation of water quality is necessary.
If the answer is 'yes' to both questions, then the tests must show that the private development interfered with by the pollution controls necessary to prevent degradation *is* an *important* economic and social development.

To answer question (1), please complete Worksheets A through L, and the Substantial Impacts Determined worksheet.
To answer question (2), please complete the DEQ Widespread Criteria worksheet.
Complete the summary information on tab following this one entitled 'Non_deg Summary'.

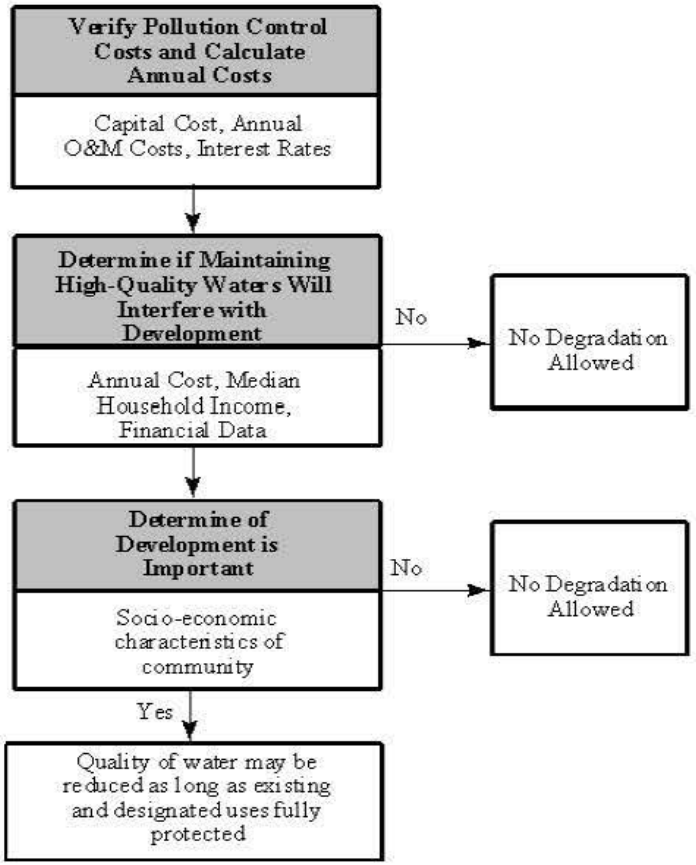
An antidegradation review must determine that the lowering of water quality is necessary in order to accommodate important economic or social development in the area in which the waters are located.

While the terminology is different, the tests to determine substantial and widespread economic impacts (used when removing a use or granting a variance) are basically the same as those used to determine if there might be interference with an important social and economic development (antidegradation). As such, antidegradation analysis is the mirror image of the analyses described in Chapters 2, 3 and 4. Variances and downgrades refer to situations where additional treatment needed to meet standards may result in worsening economic conditions; while antidegradation refers to situations where lowering water quality may result in improved social and economic conditions.

When performing an antidegradation review, the first question is whether the pollution controls needed to maintain the high-quality water will interfere with the proposed development. If not, then the lowering of water quality is not warranted. If, on the other hand, the pollution controls will interfere with development, then the review must show that the development would be an important economic and social one. These two steps rely on the same tests as the determination of substantial and widespread impacts.

The analytic approach presented here can be used for a variety of public-sector and privatesector entities, including POTWs, commercial, industrial, residential and recreational land uses, and for point and nonpoint sources of pollution.

Figure 5-1:
Antidegradation Review



Instructions: Fill out the Summary Worksheet below for Non_Deg in order to summarize the results that you reach for each step for your analysis. This is help to give a simple overview of what you found out.

OVERALL STEPS SUMMARY

Step 1: Verify Project Costs and Calculate the Annual Cost of the Pollution control project _____

Step 2: Apply the Secondary Test - Will the pollution controls needed to maintain the high-quality water interfere with the proposed private development in a way that compromises the private entity's financial well-being? If not, then they can afford the necessary water treatment. _____

Step 3: If impacts are expected to be substantial on the private entity, then the applicant goes on to determine whether the private entity contributes to economic development that is important economically and socially to the study area. (Analagous to Widespread Impacts Test) _____

Step 4: Present the Final Conclusion

_____